Year 5	Autumn Bridges	Spring Cable Cars	Summer Tinker Cad Key Chains
Values	Friendship and Love	Respect and responsibility	Perseverance and Hope
National Curriculum	Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They should work in a range of relevant contexts [for example, the home, school, leisure, culture, enterprise, industry and the wider environment]. When designing and making, pupils should be taught to: Design • use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups • generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design Make • select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately • select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities Evaluate • investigate and analyse a range of existing products • evaluate their ideas and products against their own design criteria and consider the views of others to improve their work • understand how key events and individuals in design and technology have helped shape the world Technical knowledge • apply their understanding of how to strengthen, stiffen and reinforce more complex structures • understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages] • understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors] • apply their understanding of computing to program, monitor and control their products		
Overview	After researching a range of bridges and structure reinforcements, the children will design and make their own truss bridge. This will include cutting wood to the correct length and reinforcing on the joins	Children will experiment with a range of pulley systems and create a prototype, before building their own cable car pulley system.	Children will explore how to layer, resize and rotate 3d shapes on the CAD programme TinkerCad. They will then design a keychain to promote the school and produce a final design using the programme.

Excellence and Enjoyment, Everyone and Everything. "God created you to be amazing" Ephesians 2:10

What we need to know **Red Hill Riches**	Bridges have different designs to add structure and reinforcement A truss bridge has diagonal reinforcement Wood needs to be cut using accurate measurements Pieces of wood need reinforcing on joins	Pulley systems operate to transport items from one place to the next Pulley systems are used over steep locations Pulley systems operate with wheels to rotate the cable Prototypes are needed to test a design	3d objects can be layered using Tinkercad Placeholders (hole) can be formed within a shape within a shape Shapes can be grouped and ungrouped Shapes can be rotated and resized to create an effect
Links to prior knowledge (footprints)	To understand the importance of strength and stiffness in structures. Structures need reinforcement	Wheels need an axis for movement Axel holders ensure stability for the structure	To understand that in programming a 'loop' is code that repeats something again and again until stopped. Knowledge of 3d shape names and properties
Vocabulary	structure, truss bridge, arch bridges, beam bridges, compression, reinforce.	pulley, load, effort, force,	3D shape names, vertices, layering, grouping, ungrouping, 3d printing, design, placeholder (hole), modify
Excellence **Enjoyment** **Everyone** **Everything**	Excellence: Understanding the significance of a design brief and exploring what makes a successful and high quality structures. Enjoyment: Each lesson will be engaging, creative and enjoyable. Everyone: Each lesson will be inclusive and accessible for all children, regardless of ability. Everything: Every piece of work will be celebrated, every lesson.	Excellence: Understanding the significance of a design brief and exploring how mechanisms work. Enjoyment: Each lesson will be engaging, creative and enjoyable. Everyone: Each lesson will be inclusive and accessible for all children, regardless of ability. Everything: Every piece of work will be celebrated, every lesson.	Excellence: Exploring the incredible advancements in technology. Enjoyment: Each lesson will be engaging, creative and enjoyable. Everyone: Each lesson will be inclusive and accessible for all children, regardless of ability. Everything: We will consider how technology impacts everyone and everything.

Disciplinary Knowledge	Researching different structures, giving consideration to how the structures will be used. Considering effective and ineffective designs. Exploring a range of structures for reinforcement Measuring, marking and cutting wood to create a range of structures. Using a range of materials to reinforce Improving a design plan based on peer evaluation. Testing and adapting a design to improve it as it is developed. Identifying what makes a successful structure.	Researching different types of cable cars Experimenting with pulley systems Making a prototype to support final product design Evaluating the work of others and receiving feedback on own work. Suggesting points for improvement.	Placing and manoeuvring 3D objects, using CAD. Changing the properties of, or combining one or more, 3D objects using CAD. Explaining how my product's programmed features would be useful for the audience